

SECTION 01291

MEASUREMENT AND PAYMENT

PART 1 GENERAL


1.01 MEASUREMENT AND PAYMENT

- A. Compensation provided for in the contract is full payment for performing all contract work in a complete and acceptable manner. All risk, loss, damage, or expense arising out of the nature or prosecution of the work is included in the compensation provided by the contract.
- B. Work required by the contract will not be paid for directly unless a pay item for the work is designated in the SCHEDULE OF ITEMS.
- C. Work referenced for measurement under another section will not be paid for directly unless a pay item for the work is designated in the SCHEDULE OF ITEMS for the referenced section.
- D. Work not paid for directly is considered to be included under the other contract pay items.
- E. Unless otherwise shown, work measured and paid for under one pay item will not be paid for under any other pay item.
- F. The quantity to be paid for is the quantity designated in the SCHEDULE OF ITEMS. No payment will be made for work performed in excess of that staked, ordered, or otherwise authorized.
- G. When more than one class, size, or thickness is specified in the SCHEDULE OF ITEMS for any pay item, suffixes will be added to the item number to differentiate between the items.

1.02 DETERMINATION OF QUANTITIES

The following measurements and calculations are used to determine contract quantities:

- A. For individual construction items, longitudinal and lateral measurements for area computations shall be made horizontally or corrected to horizontal measurement unless otherwise specified. Measurements for seeding, mulching, geotextiles, netting, erosion control blankets, and sodding shall be along slope lines.
- B. The average end area method shall be used to compute volumes of excavation or embankment. However, if in the judgment of the CO the average end area method is impractical, measurement shall be made by volume in hauling vehicles, or by other three-dimensional methods.

- C. Structures shall be measured according to neat lines SHOWN ON THE DRAWINGS, or as altered by the CO in writing to fit field conditions.
- D. For items that have linear measurements, such as pipes, pipe culverts, fencing, and underdrains, measurements shall be made parallel to the base or foundation upon which the structures are placed. Pipe and pipe arch culverts shall be measured along center of invert, and arches shall be measured at spring line.
- E. For aggregates weighed for payment, the tonnage weight shall not be adjusted for moisture content, unless otherwise provided for elsewhere in these specifications.
- F. Not Used 
- G. For vehicular shipments, net certified scale weights or weights based on certified volumes shall be used as a basis of measurement. Measurements shall be adjusted when material(s) have been lost from the vehicle or from the distributor, have been wasted, or otherwise have not been incorporated into the work. True weights of hauling vehicles shall be determined by weighing the empty vehicles at least once a day at the times the CO specifies. Each vehicle shall bear a plainly legible identification mark.
- H. Not Used
- I. For standard manufactured items – such as fence, wire, plates, rolled shapes, and pipe conduits – identified by gauge, weight, section dimensions, and so forth, such identifications shall be considered the nominal weights or dimensions. Unless controlled by tolerances in cited specifications, manufacturer's tolerances shall be accepted.

1.03 UNITS OF MEASUREMENT

Payment will be by units defined and determined according to measure. Unless otherwise specified, the meanings of the following terms are as follows:

- A. Cubic Yard in Place (yd^3): Measure solid volumes by the average end area method as follows:
 - 1. Measure cross sections of the original ground and use with design or staked templates, or take other comparable measurements to determine the end areas. Do not measure work outside of the established lines or slopes.
 - 2. If any portion of the work is acceptable, but is not completed to the established lines and slopes, remeasure cross sections or comparable measurements of the portion of the work. Deduct any quantity outside the designated or staked limits. Use these measurements to calculate new end areas.
 - 3. Compute the quantity using the average end areas multiplied by the horizontal distance along a centerline or reference line between the end areas. Deduct any quantity outside the designed or staked limits.

Where it is impractical to measure material by the average end area method, other methods involving three-dimensional measurements may be used.

Measure liquid volumes in accordance with Subsection 01291-1.03-H.

- B. Cubic Yard in the Hauling Vehicle: Measure the cubic yard volume in the hauling vehicle using three-dimensional measurements at the point of delivery. Use vehicles bearing a legible identification mark with the body shaped so the actual contents may be readily and accurately determined. Before use, mutually agree in writing upon the volume of material to be hauled by each vehicle. Vehicles carrying less than the agreed volume may be rejected or accepted at the reduced volume.

Level selected loads. If leveling reveals that the vehicle was hauling less than the approved volume, reduce the quantity of all material received since the last leveled load by the same ratio as the ratio of the current leveled load volume to the agreed volume. Payment will not be made for material in excess of the agreed volume.

Material measured in the hauling vehicle may be weighed and converted to cubic yards for payment purposes if the conversion factors are mutually agreed to in writing.

Compute measurement using measurements of material in the hauling vehicles at the point of delivery. Load vehicles to at least their water-level capacity. Leveling of the loads may be required when vehicles arrive at the delivery point.

- C. Each: One entire unit, which may consist of one or more parts. The quantity is the actual number of units completed and accepted.
- D. Acre (ac): $43,560 \text{ ft}^2$. Make longitudinal and transverse measurements for area computations horizontally. Do not make deductions from the area computation for individual exclusions having an area of 538 ft^2 or less.
- E. Hour (h): Measurement will be for the actual number of hours ordered and performed by the Contractor.
- F. Pound (lb): If sacked or packaged material is furnished, the net weight as packed by the manufacturer may be used.
- G. Station (Sta): 100 feet. Measure horizontal along the centerline of each roadway, approach road, or ramp.
- H. Gallon (gal): The quantity may be measured by any of the following methods.
1. Measured volume container.
 2. Metered volume. Use an approved metering system.
 3. Commercially packaged volumes.

- I. Lump Sum (LS): Do not measure directly. The bid amount is complete payment for all work described in the contract and necessary to complete the work for that item.
- J. Feet (ft): Measure from end to end, parallel to the base or foundation being measured, or horizontal.
- K. Square yard (yd²): Measure on a plane parallel to the surface being measured or horizontal.

Where measurement is horizontal, make no deductions from the area computation for incidental exclusions having an area of 1 yd² or less.

For pavement structure courses, measure the width horizontally to include the top design width and allowable curve widening. Do not include side slopes. Measure the length horizontally along the centerline of each roadway, approach road, or ramp.

- M. Thousand Board Feet (Mbf): 1,000 board feet based on nominal widths, thickness, and extreme usable length of each piece of lumber or timber actually incorporated in the job. For glued laminated timber, 1,000 board feet based on actual width, thickness, and length of each piece actually incorporated in the job.
- N. Ton (t): 2,000 pounds

No adjustment in contract unit price will be made for variations in quantity due to differences in the specific gravity or moisture content.

Use net certified scale weights, or weights based on certified volumes.

1.04 METHODS OF MEASUREMENT

One of the following methods of measurement for determining final payment is designated in the SCHEDULE OF ITEMS for each pay item:

- A. Designed Quantities (DQ): These quantities denote the final number of units to be paid for under the terms of the contract. They are based upon the original design data available prior to advertising the project. Original design data include the preliminary survey information, design assumptions, calculations, drawings, and the presentation in the contract. Changes in the number of units designated in the SCHEDULE OF ITEMS may be authorized under any of the following conditions:
 - 1. Changes in the work authorized by the CO.
 - 2. A determination by the CO that errors exist in the original design that cause a pay item quantity to change by 15 percent or more.
 - 3. A written request submitted to the CO showing evidence of errors in the original design that cause the quantity of a pay item to change by 15 percent

or more. The evidence must be verifiable and consist of calculations, drawings, or other data that show how the designed quantity is in error.

- B. Staked Quantities (SQ): These quantities are determined from staked measurements prior to construction.
- C. Actual Quantities (AQ): These quantities are determined from measurements of completed work.
- D. Vehicle Quantities (VQ): These quantities are measured or weighed in hauling vehicles.
- E. Lump Sum Quantities (LSQ): These quantities denote one complete unit of work as required by or described in the contract, including necessary materials, equipment, and labor to complete the job.

1.05 PRICE ADJUSTMENT FOR ASPHALT MATERIALS

Not Used

1.06 EARTHWORK TOLERANCES

- A. Where tolerances are shown in the contract, they are intended to define “reasonably close conformity.” Make adjustments of horizontal or vertical alignment within the tolerances specified in this contract, or shift of balance points up to 100 feet, as necessary to produce the designed roadway section and to balance earthwork. Such adjustments will not be considered “changes.”

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION